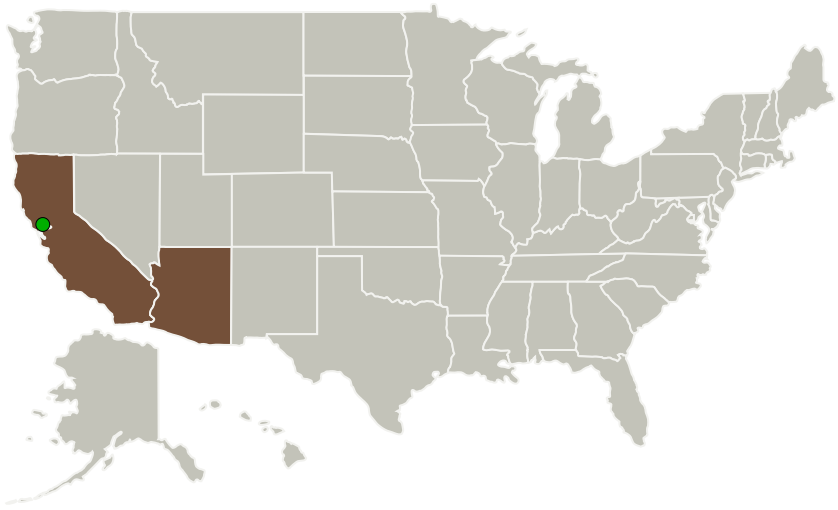
A Fully Automated Mesh Generation Tool, Phase I

Completed Technology Project (2017 - 2017)

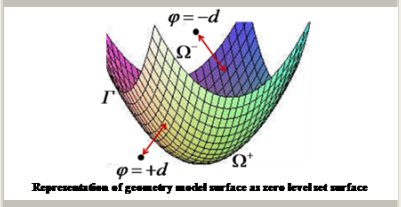
Project Introduction

This SBIR Phase I project proposes to develop a fully automated mesh generation tool which contains two parts: surface mesh generation from the imported Computer Aided Design (CAD) models and volume mesh generation from the generated surface mesh. It is well known that CAD geometry models constructed for manufacturing purposes are generally not directly useable by Computational Fluid Dynamics (CFD). Currently it usually takes several weeks to repair and defeature CAD models for surface mesh generation. The proposed effort aims to alleviate this issue by replacing the tedious CAD-fixing process with the fully automated level set approach. After obtaining high-quality surface mesh, the proposed mesh generation tool further generates high-quality volume mesh with mixed elements, taking advantages of the Cartesian cells away from the surfaces and semi-structured cells next to the surfaces. The resolution requirement is satisfied with local refinement capability.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
D&P, LLC	Lead Organization	Industry	Phoenix, Arizona
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California



A Fully Automated Mesh Generation Tool, Phase I Briefing Chart Image

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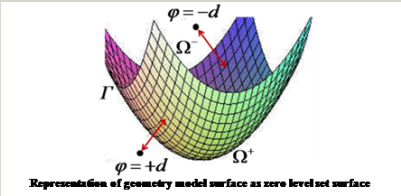
Primary U.S. Work Locations	
Arizona	California

Images



Briefing Chart Image
A Fully Automated Mesh Generation Tool, Phase I Briefing Chart Image *(https://techport.nasa.gov/image/127587)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
D&P, LLC

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

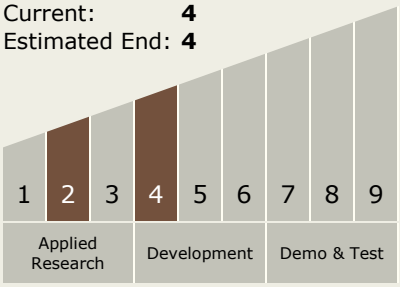
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Lei Tang

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX15 Flight Vehicle Systems
  - TX15.1 Aerosciences
    - TX15.1.7 Computational Fluid Dynamics (CFD) Technologies

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System